exaltation of a heat-responding nerve into one capable of vibrating in harmony with the shorter waves of light. In the *Euglena viridis* a colorless and transparent area of protoplasm lies in front of the pigment spot, and is the point most sensitive to light. Progressingupward we ever meet with the same arrangement, transparency immediately in front of the part to be exalted, and pigment immediately behind it.

Nature has made the most of her two factors by exposing the selected tissue to the continued impinging of waves of light, at the same time securing not only the transmission through it of the waves of heat, but their constant accumulation behind it, thereby causing the molecular constituents of the protoplasm to be thrown into the highest rates of vibration possible with the means at disposal.

Recognizing the effects of simultaneous light and heat when their influence is concentrated, by a local peculiarity, on a particular part, must it not be evident that in an individual unprotected by hair and unscreened by clothes, living beneath the vertical rays of an equatorial sun, the action of these two forces playing through a transparent skin upon the nerve endings over the entire surface of the body, must be productive of intense, but at the same time disadvantageous nerve vibrations, and that presumably such individuals as were least subject thereto would he best adapted to the surroundings. Nature having learned in ages past that pigment placed behind a transparent nerve will exalt its vibrations to the highest pitch, now proceeds upon the converse reasoning, and placing the pigment in front of the endangered nerve reduces its vibrations by so much as the interrupted light would have excited, a quantity which, though apparently trifling, would, when multiplied by the whole area of the body surface, represent a total of nervous action that if continued would soon exhaust the individual and degrade the species.

Thus it is that man still retains in its full strength the color of skin which, while it aided him materially in his early escape from his enemies, is now continued because it has a more important office to fulfill in warding off the millions of vibrations a second which would otherwise be poured in an uninterrupted stream upon his exposed nervous systen.—*Nature, Aug. 21, '84.*

MICROSCOPY.[1]

Modern Methods of Microscopical Research.—Microscopical technique has made such rapid progress in the last few years that it has been found necessary to supplement our hand-books of methods through the publication of special journals and departments of journals which undertake to bring together the latest discoveries and improvements. A new and very important line of

[1] Edited by Dr. C. O. Whitman, Mus. Comparative Zoology, Cambridge, Mass.

work has thus been started, and this work is destined to grow rapidly in general importance and interest. It may be worth while to consider briefly the character and the urgency of such work, and to suggest how its aims can be promoted by those who are actively engaged in the various fields of microscopical research.

The microtome has come to occupy a place in the zoölogical laboratory second in importance only to the microscope itself. Many improvements in details and in accessories have followed the introduction of this instrument, and a whole series of methods has sprung up in connection with its use. In short, we have a new art which has been appropriately called *microtomy*.

The general favor with which the microtome has been received is the best evidence of its usefulness. There ought no longer to be any place for prejudice or indifference in regard to its merits. The use of the instrument is so simple and the methods connected with it so easily acquired that no naturalist can afford to work without it.

It is, not enough to possess a microtome and to be master of its simpler uses; the working naturalist should have the best, or one of the best instruments in the market, and it is important that he should have the earliest information of any improvements attending its use.

Within the last four or five years the improvements and discoveries in microtomy have been both numerous and extremely important. Among these may be mentioned the ribbon method of cutting serial sections, discovered by Caldwell; the methods of fixing sections on the object-slide, discovered by Giesbrecht, Schällibaum and Mayer; the various section-smoothers, notably those invented by Mayer, Andres, Giesbrecht, Schulze and Decker; the use of collodion to prevent the crumbling of brittle sections, proposed by Mason; and the methods of reconstructing objects from serial sections employed by His and Born. A large number of new preservative and staining fluids have been described; and new methods of killing, hardening, preserving, staining and imbedding have been recommended. The rapid development of methods is at once the result and one of the chief causes of the increasing activity in every field of biological research. The improvement of methods leads to the re-investigation of old subjects, and at the same time prepares the way for attacking new problems. The investigator who neglects to keep himself informed of the progress in methods of study, throws away his opportunities, and has the vexatious mortification of seeing himself outdone and his work superseded by that of more skillful hands.

So much depends on successful methods of preparing objects for investigation, that naturalists are now expected to state precisely how their results have been obtained. But the methods

are usually given with the investigations themselves, and are therefore scattered about in different journals and isolated publications; hence arises the necessity for some sort of repertory in which the stray accounts and straggling items may be gathered and summarized. The department of microscopy will make this work its special concern. The necessity for immediate information makes it impossible to avoid a more or less chaotic presentation of subjects, and reviews of progress in special directions will therefore be in order from time to time.

There is another feature of the work proposed in this department to which we wish to invite particular attention. Experience has shown that each different object requires a special mode of treatment, and that the same object must be treated differently according to the nature of the problem in hand. For example, the course of preparation which has given satisfactory results in the study of the development of the ova of a certain species, may prove quite inadequate when applied to a different though closely allied species. And it has been found that different stages in the development of the same ovum often require different modes of preservation. The investigator cannot, therefore, blindly adopt the methods employed by others, but must, in by far the greater number of cases, determine by experiment the method to be pursued. But such experiments demand a general knowledge of methods, and, above all, a knowledge of the special applications of methods in cognate subjects. It is in the adaptation of methods to special subjects that the skill of the investigator is shown. Our information of the methods employed in specific cases should be as extended as possible. To meet this need entire courses of methods that have led to successful results in typical cases will continue to find a place in this department.

Such then are the aims of "microscopy." If those who take an active interest in the cultivation of microscopical methods desire to further these aims, they can do so, and at the same time confer a favor, by communicating to the editor any information respecting methods which they have found useful, or by sending published accounts of important methods for review in these pages.

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SCIENTIFIC NEWS.

— The winter session of the Teachers' School of Science connected with the Boston Society of Natural History commenced in October with a lecture on sponges, by Professor Alpheus Hyatt, who will conduct a course of ten lessons upon the structure of animals. The plan pursued by Professor Hyatt has special reference to the teaching of methods of observation. On. Jan. 3d will be commenced a supplementary course of ten practical laboratory